APPENDIX G: NATURAL FUELS

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PAST CONDITION

Low Severity/High Frequency *and* Variable Severity/High Frequency *Fire Regimes*

Naturally occurring fires and fire use by Native Americans provided a low overall fuel loading in many areas. Large fires were common, burning many areas with low to moderate fire intensity. Smoke was prevalent in the valley and drainages during the late summer and early fall.

Variable Severity/Low and Moderate Frequency *and* High Severity/Low Frequency *Fire Regimes*

In many areas, Native American fire use and naturally occurring wildfires resulted in lower fuel loading than those found today. Uncontrolled fires were common and burned areas larger than following the advent of modern fire suppression. Larger fire size, differences in vegetation patterns and changing environmental factors created a mosaic of areas burned with low, moderate and high intensity. Smoke was common in the valley and drainages during the late summer and early fall.

CURRENT CONDITION

Low Severity/High Frequency *and* Variable Severity/High Frequency *Fire Regimes*

Fuels are in the process of conversion from finer fuels with little vertical arrangement to larger and heavier fuels with substantial vertical arrangement. Fires are less frequent and more intense due to this change in fuel structure. Providing for public and firefighter safety is becoming more difficult as improvements (human-created structures) and other values become more numerous and harder to protect when threatened by wildfire. Few projects are implemented to reduce or convert fuels to a more natural state.

Variable Severity/Low and Moderate Frequency *and* High Severity/Low Frequency *Fire Regimes*

Forest fuels are accumulating at an increasing rate making fire suppression efforts less effective and average escaped fire sizes are getting larger (Figure 2, Issue 4). During the period from the 1930's through the 1990's, the increase in escaped fire sizes demonstrates the effects of increased fuels accumulation. Fires burning an area are more frequently of high intensity. Public and firefighter safety is becoming difficult to provide, and actions to protect improvements and values

threatened by wildfire are becoming more hazardous. Few projects are implemented to reduce fuel to a more naturally occurring state.

DESIRED FUTURE CONDITION

Low Severity/High Frequency *and* Variable Severity/High Frequency *Fire Regimes*

Fuel reduction projects are accomplished reducing ladder fuels and a significant amount of understory vegetation. Wildfires burn with less intensity, favoring larger trees, with some fires allowed to burn to topographic barriers. Public and firefighter safety is increased due to reduction in fuel with improvements and other values becoming more defensible. Management ignited fire, prescribed natural fire and mechanical fuel treatments are accepted as available tools, where appropriate, and are used in reducing fuel loads on areas where ecological systems, improvements or other values are at risk due to fuel accumulation.

Variable Severity/Low and Moderate Frequency *and* High Severity/Low Frequency *Fire Regime*

Effects of a successful program of re-introducing fire to the environment will include a more fire resistant forest with a variety of opening sizes and seral stages across the landscape. The resulting stand conditions will provide increased public and firefighter safety, and better protection of improvements and other values at risk.

More smoke from management activities will be produced on an average annual basis than has been in the last 5 years, but no more than was being produced during the period 1985 – 1994 from fuel reduction treatments following timber harvest activities. The smoke produced will be managed according to the Oregon Smoke Management Plan, as it was during that period. As the amount of area that has had fire re-introduced increases the production of smoke from managed areas subsequently burned during wildfire will be less (Final Report, R. V. Vihnanek and R. D. Ottmar, 1991) and fire perimeters will be more easily controlled.

Management ignited fire, prescribed natural fire and mechanical fuel treatments are accepted as available tools, where appropriate, used in reducing fuel loading on areas where ecological systems, improvements or other values are at risk due to fuel accumulation.

TREATMENT PRIORITIZATION

Many factors should be considered when recommending an area for fuel treatment. Fire regime, fire history and current condition class (defined below) of the fire-dependent ecosystem are key considerations. Effects on improvements (any human-constructed structures) and resource values are also critical factors. Partnerships in planning, financing and accomplishing fuel treatment should be cultivated.

The best projects will change the outcome if a wildfire subsequently burns the area. Increased safety, effective protection of values, improvements and limiting unacceptable environmental consequences during a later wildfire are examples of "changes in the outcome".

CONDITION CLASSES

Three condition classes have been developed to categorize the current condition with respect to each of the five historic Fire Regimes (Protecting People and Sustaining Resources – A Cohesive Strategy, USFS, 1999). The relative risk of fire-caused losses of key components defining the ecosystem increases as the Condition Class increases.

Condition class descriptions: Condition classes are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion, timber harvesting, grazing, introduction and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities.

Condition Class 1 - Maintenance Treatment Needed

When considering ecosystem condition, high priority is given to maintaining short fire interval ecosystems not currently threatened by fuel accumulation or vegetative changes. These ecosystems are functioning as they have historically, but are at risk if fire continues to be excluded. This treatment would be considered ***maintenance***.

Attributes of Condition Class 1	Example Management Options
• Fire regimes are within or near an historical range. • The risk of losing key ecosystem components is low. • Fire frequencies have departed from historical frequencies (either increased or decreased) by no more than one return interval. • Vegetation attributes (species composition and structure) are intact and functioning within an historical range.	Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire use.

Condition Class 2 - Restorative Treatment Needed

Restoring ecosystems that are slightly impacted by fuel accumulation or vegetative changes to their historical condition is the next priority. The treatment would be considered ***restorative***.

Attributes of Condition Class 2	Example Management Options
• Fire regimes have been moderately altered from their historical range. • The risk of losing key ecosystem components has increased to moderate. • Fire frequencies have departed (either increased or decreased) from historical frequencies by more than one return interval. This change results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. • Vegetation attributes have been moderately altered from their historic ranges.	Where appropriate, these areas may need moderate levels of restoration treatments, such as fire use and hand or mechanical treatments, to be restored to the historical fire regime.

Condition Class 3 - Conversion Treatment Needed

Conversion of an ecosystem that has been heavily impacted due to fire exclusion back to historical conditions is viable, but of low priority. A treatment here would be considered ***a high level of restoration***.

Attributes of Condition Class 3	Example Management Options
• Fire regimes have been significantly altered from their historical range. • The risk of losing key ecosystem components is high. • Fire frequencies have departed (either increased or decreased) by multiple return intervals. This change results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. • Vegetation attributes have been significantly altered from their historic ranges.	Where appropriate, these areas need high levels of restoration treatments, such as hand or mechanical treatments. These treatments may be necessary before fire is used to restore the historical fire regime.

TREATMENT METHODS

Depending on current condition class, fire regime, and management objective a number of treatment methods are available to the manager.

Determining which fuel hazard reduction method to use depends on how well it accomplishes management objectives and the effects it will have on other resources. One of the following may be the appropriate treatment method (other methods may also be considered):

1. **Hand piling and burning**

   Treatment by this method helps reduce risk of fire spread. Scattered burnt areas remain on the forest floor and the effect of broadcast burning on existing vegetation is minimized. Burning of piled material should be accomplished in the same season during which it was piled to minimize the likelihood of occupation by wildlife.

2. **Machine (grapple) piling and burning**

   Effects are similar to hand piling. Machinery considerations regarding soil compaction, disturbance, and ability to work on steep slopes and between existing trees must be taken in to account.

3. **Chipping**

   This method may leave material on site, since it primarily affects the distribution of fuel, creating a more compact layer of chipped fuel. Machinery considerations regarding soil compaction, disturbance and ability to work on steep slopes and between existing trees must also be taken into account.

4. **Yarding tops to landing**

   In conjunction with other management activities, fine fuels can be reduced by utilization or by yarding to one location for disposal.

5. **Require yarding of small material**

   This method could include yarding treetops to the landing or specifying smaller minimum harvest diameters. Fine fuels can be reduced by utilization or yarding to one location for disposal.

6. **Lop and scatter**

   Fuel arrangement is changed by this treatment to reduce the rate of fire spread in the existing fuel bed. This is most effective where small concentrations of fuel are the concern.

7. **Jackpot burn**

   Timing of this method is important, because of potential fire spread into previously unburned areas. This treatment is best used prior to a cooler or moister weather trend.

8. **Prescribed fire**

   Prescribed fire can be used as a hazard reduction tool or to meet other objectives such as protection or enhancement of stand conditions for old growth associated species. Using low intensity prescribed fire to reduce fine fuels leaves larger fuels intact and

minimizes impact on residual stands, soils, mychorrizal systems, invertebrates, and small mammals.

Other objectives that can be met using prescribed fire include: increasing viability of important fire dependent species, retarding high density seedling reproduction, enhancing grasses, sedges, flora, and fauna associated with meadows, contributing to landscape diversity, and maintaining species associated with natural fire return interval in stands.

Risks associated with prescribed fire include mortality of overstory trees intended for retention and escape of the fire to adjacent areas.

9. Modified wildfire suppression

Resource values, firefighter safety, ecological benefits and costs are considered when developing strategies for the suppression of a wildfire. Strategies can range from immediate and full suppression to limited suppression and monitoring.

In areas with fire management plans, allowing a Wildland Fire for Resource Benefit is possible. Currently, the Wildernesses along the Cascade crest have an approved plan.

The objective of all suppression strategies is to protect life, resources and property. There is some flexibility in choosing the most effective suppression strategy in areas with an approved fire management plan and where fire effects will make a positive contribution to hazard reduction or reestablishment of fire processes that meet desired habitat conditions. Strategies other than full suppression are based on expected fire behavior and its effect on the environment.

FUELS MANAGEMENT PROGRAM

The following tables display potential considerations by fire regime and fire zone. Given current conditions, it will take a few years to complete planning and gain experience and expertise in the different fuel types.

Project planning teams may find the tables below and the enclosed maps helpful in determining priority areas for treatment. It is expected that they will designate specific areas for treatment based on their ability to more closely examine the actual conditions and risk.

Evaluation and monitoring of the treatments will occur during and following implementation to determine if they still represent valid expectations.

Projects listed under the Short Term Goals are opportunities to determine if the assumptions for treatment type, size or location should be modified. Additional projects should be planned based on the results of these evaluations.

Fire Zone 1 – High Cascades

Fire Regime	Short Term (5yr) Goals
1. Low Severity/ High Frequency	
2. Variable Severity/ High Frequency	• Treat areas, concentrating on mid/late seral stands to create gaps, multiple age classes and large snags. Monitor for effectiveness • Large fire-resistant trees are maintained.
3. Variable Severity/ Moderate Frequency	• Increase within stand heterogeneity (gaps, snags, multiple age classes, large snags) in mid/late seral stands. • Review the approximate 10,000 acres of high/moderate fire potential within *wildland/urban interface* to determine which areas are at risk.
4. Variable Severity/ Low Frequency	• Laboratory showcase[1] that creates within stand heterogeneity including 10-20 acres of snag creation. • Review the 19,000 acres within *wildland/urban interface* to determine which areas are at risk.
5. High Severity/ Low Frequency	• Laboratory showcase that creates within stand heterogeneity including 10-20 acres of snag creation. • Create 1-3 early seral patches between 500-2,000 acres leaving residual structure on site. • Review the 16,000 acres within wildland/urban interface to determine which areas are at risk.

[1] Fire management demonstration areas, as defined by the Federal Wildland Fire Policy, 1995.

Fire Zone 2 – Low Cascades

Fire Regime	Short Term (5yr) Goals
1. Low Severity/ High Frequency	
2. Variable Severity/ High Frequency	• Maintain large oaks • Conditions suitable for oak stands are restored • Treat areas, concentrating on mid/late seral stands to create gaps, multiple age classes and large snags. Monitor for effectiveness. • Large fire-resistant trees are maintained.
3. Variable Severity/ Moderate Frequency	• Increase within stand heterogeneity (gaps, snags, multiple age classes large snags). • Monitor effectiveness after some areas have been treated. • Review the 6,000 acres within wildland/urban interface to determine which areas are at risk.
4. Variable Severity/ Low Frequency	• Laboratory showcase that creates within stand heterogeneity including 10-20 acres of snag creation. • Review the 21,000 acres within wildland/urban interface to determine which areas are at risk
5. High Severity/ Low Frequency	• Laboratory showcase that creates within stand heterogeneity including 10-20 acres of snag creation. • Review the 3,000 acres within wildland/urban interface to determine which areas are at risk.

Fire Zone 3 – South Cascades

Fire Regime	Short Term (5yr) Goals
1. Low Severity/ High Frequency	•
2. Variable Severity/ High Frequency	• Favor oak, madrone, Ponderosa pine, sugar pine • Favor forbs & grasses in understory • Large fire-resistant trees are maintained • Maintain large oaks • Conditions suitable for oak stands are restored. • Early seral stands are on a trajectory towards multiple species. Monitor for effectiveness. • In mixed conifer, treat mid/late seral stands. Monitor for effectiveness • Large fire-resistant trees are maintained. • In Douglas fir dominated, treat some areas, concentrating in mid/late seral stands. • Monitor for effectiveness after some areas have been treated. • Large fire-resistant trees are maintained.
3. Variable Severity/ Moderate Frequency	• Treat a substantial portion of young stands to reduce fuels and create structures beneficial to wildlife. • Review the 11,000 acres within wildland/urban interface to determine which areas are at risk.
4. Variable Severity/ Low Frequency	• Laboratory showcase that creates within stand heterogeneity including 10-20 acres of snag creation. • Review the 10,000 acres within wildland/urban interface to determine which areas are at risk.
5. High Severity/ Low Frequency	•

Fire Zone 4 – Valley/Foothills

Fire Regime	Short Term (5yr) Goals
1. Low Severity/ High Frequency	• Prairie, oak savanna, woodland, and forest created and/or restored. • Oak and pine elements are enhanced in sites where they are present. • Recreate open Douglas fir forest with a relatively simple understory (grass, poison oak, oceanspray). • Create gaps, snags, & within stand heterogeneity in mid to late seral stands within the regime.
2. Variable Severity/ High Frequency	• Prairie, oak savanna/ woodland created and/or restored. • Oak and pine elements are enhanced in sites where they are present. • Create gaps, snags, & within stand heterogeneity in mid to late seral stands.
3. Variable Severity/ Moderate Frequency	•
4. Variable Severity/ Low Frequency	•
5. High Severity/ Low Frequency	•

Fire Zone 5 – Coast Range

Fire Regime	Short Term (5yr) Goals
1. Low Severity/ High Frequency	•
2. Variable Severity/ High Frequency	•
3. Variable Severity/ Moderate Frequency	• Increase within stand heterogeneity (gaps, snags, multiple age classes, large snags). Monitor for effectiveness • Review the approximate 200 acres of moderate fire potential within wildland/urban interface
4. Variable Severity/ Low Frequency	• Laboratory showcase that creates within stand heterogeneity including 10-20 acres of snag creation. • Review the 3,000 acres within wildland/urban interface to determine which areas are at risk.
5. High Severity/ Low Frequency	•

The following suggests a method of documenting attributes of an area planned for fuels treatment and the environmental factors considered.

Planning Area Attributes

Planning Area Name		
Environmental Considerations	**Description**	**Considerations**
Fire Regime		
Condition		
Slope Percent		
Aspect		
Effect on fire-dependent habitat (*e.g.*, oaks, pines, meadows)		
Wildlife habitat structure		
Meadows/openings		
TES Species		
Survey & Manage Species		
Levels of Forest Pathogens		
Fuels Availability		
Activity Type		
Water quality		
Fisheries		
Riparian		
Emissions		
Noxious Weeds		
Safety		
Improvements		
Partners		
Visuals		
Controversy		

OTHER STRATEGIC ACTIONS AND CONSIDERATIONS

- The Forest Plan should include language that allows use of Wildland Fire for Resource Benefit (formally known as PNF) outside of Wilderness and the use of prescribed fire (formally known as MIF) inside of Wilderness.
- Fuel treatments proposed for hazardous fuels financing should occur in areas identified in a NEPA (National Environmental Policy Act) process by project level Interdisciplinary Teams as high priority, high probability of being carried forward to implementation, and high potential for success.
- Where fuels accumulation may cause an unacceptable outcome when using prescribed fire to restore ecosystem components, consider first preparing the area using mechanical methods, then following up with prescribed fire at a later time.
- The prudent and increased use of Wildland Fire for Resource Benefit will assist in reducing fuels across the landscape, both inside and outside of wilderness. In certain cases, a modified suppression strategy may be appropriate for safety, ecosystem function and financial considerations.
- Land management planning efforts should strive to identify all the opportunities to reintroduce fire within a planning area, regardless of probable funding method.
- The inability of a management activity designed to restore ecosystem health to fully finance the fuel treatment should not be considered cause to cancel the activity. Alternative methods to augment financing should be considered.

BIBLIOGRAPHY

Vihnanek, R. V. and R. D. Ottmar. 1991. Final Report: Severity and Emission Production Differences between Treated and Untreated Logging Slash Areas Burned in the Shady Beach Fire. On file Willamette NF, Eugene, OR.

USDA Forest Service. 1999. Protecting People and Sustaining Resources – A Cohesive Strategy. On the internet at http://www.fs.fed.us/pub/fam/Cohesive-Strategy-00oct13.pdf